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(54) Bleach tablets

(57) Bleach tablets comprising in addition to optional usual adjuvants and additives 45 to 85 % by weight coated percarbonate, 0 to 20 % by weight bleach activator calculated as TAED, 1 to 50 % by weight layered silicate and/or alkali metal silicate, 0 to 25 % by weight sodium/potassium carbonate, 0 to 25 % by weight sodium/potassium bicarbonate, 5 to 35 % by weight polyfunctional carboxylic acid calculated as citric acid, 0 to 8 % by weight polyethylene glycol, 0 to 5 % by weight complex-binder, 0 to 2 % by weight paraffin oil, 0 to 5 % by weight disintegrating agent, 0 to 10 % by weight polymer and 0 to 10 % by weight enzymes. The bleach tablets are intended for use together with usual fabric detergent compositions and display a good storage stability and good tablet-technical properties, such as rate of dissolution and tablet strength, and they are very environmentally desirable.

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Description

The present invention relates to bleach tablets intended to be used together with usual textile detergent compositions so as to obtain an improved washing effect and stain removal of bleach-sensitive stains.

During recent years, the detergent composition market has focused on developing more and more concentrated products which also take into account the environmental aspects. Accordingly, the tendency has been to develop the so-called compact formulations based on environmentally desirable and easily biodegradable raw materials, said compact formulations having bulk densities in the range of from approximately 0.6 to 1.0 kg/litre. A natural continuation of this development has been the introduction of detergent tablets, especially for use in dish washing machines, and having bulk densities of from approximately 1.4 to 1.7 kg/litre.

However, the preparation of such highly concentrated detergent tablets involves formulation problems, because the active ingredients of the tablets are very tightly compressed, often at compression pressures of from 20 to 180 KN.

For a number of years, oxygen-based bleaches, such as sodium perborate, have mainly been used. An increasing awareness of the potential environmental hazard of these boron-containing bleaches has, however, intensified the interest in other oxygen-based bleaches.

Particular attention is here attached to potassium peroxomonosulphates and alkali metal perhydrates, such as sodium percarbonate which are dissolved quickly in water and which in addition to their bleaching effect also have an alkaline effect supporting and intensifying the washing effect. A drawback of sodium percarbonate is, however, its poor stability which presents a limiting factor for its use in detergent compositions.

Factors adversely affecting the stability are especially the presence of moisture, temperatures exceeding 28°C to 30°C, as well as the presence of metal ions, such as iron, manganese etc.

The use of sodium percarbonate is particularly difficult with respect to the formulation of the tablets because the compression pressure necessary for the tabletting results in heat development which in turn implies that the tablets reach critical temperatures initiating the decomposition of sodium percarbonate.

Attempts have therefore been made to stabilise alkali metal percarbonates by incorporating stabilising components and/or by protecting the alkali metal percarbonates by means of a coating. Such a coating is, however, completely or partially destroyed during the high compression pressures used for the tabletting with the result that the protecting effect of the coating is reduced heavily.

EP publication No. 0 481 792 discloses bleach tablets comprising a bleach activator having a pseudo - first order perhydrolysis rate constant (K_{obs}) of from 1.5×10^{-4} to 350×10^{-4} sec^{-1} as well as a percarbonate being protected against decomposition by means of an inorganic salt, especially sodium carbonate.

Example 4 of the publication describes a bleach tablet composition containing 12.5 parts by weight of sodium percarbonate, 10.25 parts by weight of spray-dried sodium carbonate containing a small amount of polymer, and 2.25 parts by weight of TAED.

The very high amount of carbonate in these bleach tablets may, however, cause problems of formation of incrustations in the laundry.

Furthermore, the bleach tablets known from EP publication No. 0 481 792 have a very long rate of dissolution, and when used in the short washing programmes increasingly for environmental reason, this very long rate of dissolution may have the result that the tablets are not dissolved before the main washing is terminated. As a result, the cleaning and bleaching effect is considerably reduced. In addition, the tablets may be caught in a pocket, thereby causing a miscolouring due to the long contact period.

Thus, it is the object of the present invention to provide storage stable bleach tablets based on a percarbonate with a good bleaching effect, a satisfactory rate of dissolution, as well as a low tendency to form incrustations in the laundry.

Such a storage stability is surprisingly obtained by the bleach tablets according to the invention, which are characterised in that in addition to optional, usual adjuvants and additives they comprise

coated percarbonate	45 to 85 % by weight
bleach activator, calculated as TAED	0 to 20 % by weight
layered silicate and/or alkali metal silicate	1 to 50 % by weight
sodium/potassium carbonate	0 to 25 % by weight
sodium/potassium bicarbonate	0 to 25 % by weight
polyfunctional carboxylic acid, calculated as citric acid	5 to 35 % by weight
complex-binder	0 to 5 % by weight
paraffin oil	0 to 2 % by weight
disintegrating agent	0 to 5 % by weight

(continued)

enzymes	0 to 10 % by weight
polymer	0 to 10 % by weight

Further scope of applicability of the present invention will become apparent from the detailed description given hereinafter. However, it should be understood that the detailed description and specific examples, while indicating preferred embodiments of the invention, are given by way of illustration only, since various changes and modifications within the spirit and scope of the invention will become apparent to those skilled in the art from this detailed description.

The bleach tablets are intended for use in ordinary household washing machines together with conventional detergent compositions so as to obtain an improved washing effect and stain removal of bleach-sensitive stains, such as juice, wine, tea as well as some protein-based stains. Thus, an improved washing effect is also obtained at low temperatures, such as at 40°C and therebelow. The bleach tablets are highly practical, as the use thereof can be adapted to the washing habits prevailing in both Europe and in Asia without any problems.

The bleach tablets according to the invention are advantageous in possessing a surprisingly good storage stability. Thus, the particular composition of the tablets has the effect that the coated percarbonate is not seriously deteriorated during the tabletting, and that the heat generated during said tabletting does not initiate the decomposition of the percarbonate to a harmful degree as is the case in conventional bleach-containing tablets.

The content of layered silicate (in Germany known as "Schichtsilikat") and/or alkali metal silicate appears to be of great importance to obtain the good stability of the bleach tablets, but it is not known exactly how these silicates may protect the percarbonate bleach.

The amount of layered silicate and/or alkali metal silicate is in the range of from 1 to 50 % by weight, preferably from 1 to 25 % by weight, more preferred from 2 to 10 % by weight, and most preferred from 4 to 8 % by weight.

The layered silicate is commercially available under the trade name SKS-6 supplied by Hoechst AG, Frankfurt, Germany.

The alkali metal silicate used has the composition of $Na_2O : SiO_2 = 1: 1$ to $1 : 3.5$, preferably $1 : 1.6$ to $1 : 2.6$. A preferred alkali metal silicate is sodium disilicate with the composition of $Na_2O : SiO_2 = 1 : 2$ e.g. supplied by Crossfield Chemie, Eijsden, The Netherlands under the trade name Pyramid P50.

The coated percarbonate being an ingredient of the bleach tablets according to the invention is of a completely conventional nature.

An alkali metal percarbonate is advantageously used as it is easily soluble in water and in addition to the bleaching effect has an alkaline effect supporting and intensifying the washing effect. Examples of suitable coated percarbonates are two commercially available products, viz. sodium percarbonate coated-Q10 (which is coated with a boron containing coating) supplied by DEGUSSA AG, Frankfurt, Germany, and PCS-C Sodium Carbonate Peroxyhydrate (coating based on a sulphate and sodium carbonate supplied by Solway Interox GmbH, Pullach, Germany.

The coated percarbonate is used in an amount of from 45 to 85 % by weight, such as from 50 to 65 % by weight.

Furthermore, in addition to the coated percarbonate, a small amount of a further bleach, such as potassium peroxomonosulphate, may optionally be incorporated.

The bleach tablets may furthermore, if desired, comprise a bleach activator. Non-limiting examples of bleach activators are tetraacetylmethylenediamine, TAED (tetraacetylethylenediamine), TAGU (tetraacetyl glycoluril), PAGE (pentaacetyl glucose), p-hydroxybenzene sulphonates, NOBS (sodium nonanoyloxybenzene sulphonate) and sodium octanoyloxybenzene sulphonate. Most preferred is TAED, which may optionally be present in coated form. The bleach activator is used in an amount ranging from 0 to 20 % by weight, preferably from 2 to 15 % by weight, and more preferred from 4 to 10 % by weight, such as from 5 to 6 % by weight.

In a preferred embodiment of the invention the bleach tablets contain a coated percarbonate and a bleach activator, calculated as TAED, in a weight ratio ranging from 2: 1 to 20:1, such as from 3:1 1 to 15:1, e.g. from 3.5:1.1 to 12:1.

The bleach tablets contain, furthermore, a polyfunctional carboxylic acid. As a general rule, polyfunctional carboxylic acids can be defined as such acids which in addition to the one obligatory carboxylic acid group also contain at least one further functional group selected from carboxyl and hydroxy. Furthermore, the polyfunctional acids can also contain nitrogen. Non-limiting examples of such polyfunctional carboxylic acids are citric acid, nitrilotriacetic acid (NTA), EDTA and isoserine diacetic acid, of which preference is given to citric acid.

The polyfunctional carboxylic acid forms part of the bleach tablets in an amount of from 5 to 35 % by weight, preferably from 14 to 22 % by weight, such as from 19 to 21 % by weight, calculated as citric acid.

Other ingredients advantageously forming part of the bleach tablets according to the invention are for instance sodium/potassium carbonate and sodium/potassium bicarbonate which in combination with citric acid improve the solubility.

Furthermore, a binder may advantageously be incorporated, such as polyethylene glycol, e.g. polyethylene glycol

of a molecular weight of from 200 to 8,000.

Moreover, a complex-binder and a precipitation inhibitor may advantageously be incorporated, such as a phosphonate, i.e. a phosphonic acid or a salt thereof. Examples of suitable phosphonates and phosphonic acids are for instance ethane-1-hydroxy-1,1-diphosphonic acid (HEDP), ethylene diaminetetra(methylene phosphonic acid) (EDTMP), diethylene triaminepenta(methylene phosphonic acid) (DETPMP), aminotrismethylene phosphonic acid (ATMP) as well as salts thereof. Among these the disodium and the tetrasodium salt, respectively, of ethane-1-hydroxy-1,1-diphosphonic acid are particularly preferred. An example of a commercially available product is Sequion 10 Na PDR, supplied by G. Bozzetto S.p.A., Bergamo, Italy, and which is the disodium salt of ethane-1-hydroxy-1,1-diphosphonic acid..

Among other complex-binders EDTA (ethylenediaminetetraacetic acid), DETPA (diethylenetriaminepentaacetic acid), HEEDTA (hydroxyethylethylenediaminetriacetic acid) and ISDA (isoserinediacetic acid).

Moreover, enzymes may advantageously form part of the bleach tablets according to the invention. Examples thereof are for instance mixtures of specifically acting types, such as proteases, carbohydrases, esterases, lipases, oxidoreductases, catalases, peroxidases, ureases, isomerases, lyases, transferases, desmolases or nucleases. Among commercially available products Esperase®, Savinase® and Alcalase® (proteolytic enzymes), Termamyl® (amylolytic enzymes), Lipolase (lipolytic enzymes) and Celluzyme (cellulytic enzymes) can be mentioned all supplied by Novo Nordisk A/S, Bagsværd, Denmark.

Moreover, if desired, polymers may form part of the bleach tablets. In principle such polymers may be selected among all conventional polymers utilized within the detergent industry, such as the polyanionic polymers as described in US patent Nos. 3,308,067, 3,723,322, 4,144,226 and 4,146,495 and in GB patent No. 1.596.756. Among these homo- or copolymeric carboxylic acids and sodium and potassium salts thereof are preferred. If polymers are incorporated, the amount hereof typically ranges from 1 to 10 % by weight.

Examples of further conventional laundry detergent ingredients are agents preventing the running of colour, antiagglutinants, dyes, deodorising agents, antioxidants, solvents, foam inhibitors, perfume, optical brighteners, antistatics, nonionic tensides, bactericides, fungicides, hydrotropic agents, wetting agents and fillers.

The nonionic tensides used can in principle be selected from all conventional nonionic tensides usually prepared by condensation of a hydrophilic alkylene oxide with a hydrophobic compound. Examples of suitable nonionic tensides are alkoxylated nonionic surfactants, where the alkoxy moiety contains an ethylene oxide, propylene oxide and/or butylene oxide as well as mixtures thereof. Suitable hydrophobic compounds are alcohols, thioalcohols, dioles, fatty acids, fatty acid amides, alkanesulphone amides, alkyl amines as well as alkyl phenols.

Among the nonionic tensides, especially ethoxylated compounds of primary and secondary fatty alcohols are preferred.

Among commercially available products, Plurafac LF 403 can be mentioned which is a fatty alcohol alkoxylate supplied by BASF, Ludwigshafen, Germany.

In addition to the nonionic tenside, the tenside component may also include other tensides of a non-anionic nature, such as all known types of amphoteric, ampholytic and zwitterionic surfactants.

By the preparation of the bleach tablets according to the invention conventional tabletting adjuvants are usually incorporated, such as starch, magnesium stearate, magnesium silicates, glycerol, glucose, paraffin oil, polyethylene glycol and disintegrating agents, such as polyvinyl pyrrolidone (PVP), polyvinyl polypyrrolidone (PVPP) and cellulose-based or cellulose-modified compounds.

Paraffin oil functions as a lubricant and facilitates the tabletting, and it is advantageously included in the bleach tablets according to the invention. As an alternative, it is possible to use corresponding compounds having the same or a similar function, such as for instance glycerol.

The preparation and the tabletting of the bleach tablets are carried out in a manner known per se, and a more detailed description can for instance be found in the US patent Nos. 4,099,912, 4,828,749 and 4,913,832 as well as the DE patent Nos. 355,626 and 3,827,895.

The formulation of a washing-intensifying bleach tablet requires fulfilment of a wide range of parameters in order to obtain the desired functional and performance characteristics.

Rate of dissolution:

The tablet is to be placed directly in the drum of the washing machine and may not be resident in fabric creases, pockets etc. or in the washing machine window/sealing ring for a long period of time. Consequently, the rate of dissolution should be as short as possible, preferably of no more than 30 to 180 sec.

Apart from a minor acceptable increase of the rate of dissolution compared to the initial rate of dissolution measured within 5 to 24 hours after the preparation, said rate of dissolution must not, of course, be increased appreciably when stored for a long period of time.

Tablet strength:

The tablet strength presents a vital parameter for the processes following the tabletting, i.e. the packaging and transport, and in order to obtain a good durability this parameter must not be noticeably reduced over time.

In addition to being very stable as regards the percarbonate, the bleach tablets are also very advantageous in being environmentally desirable and by displaying good tablet-technical properties, such as a fast rate of dissolution and a high tablet strength, and these properties do not change to a noticeable extent during storage. In addition to ensuring the correct function and performance of the tablets, such properties are also important for the durability of the tablets.

The following examples illustrate the bleach tablets according to the invention in greater details.

Example 1

Based on the following recipes, bleach tablets were prepared having a weight of 30 g, a diameter of 40 mm and a height of 17 mm.

Table 1

Ingredients/Recipe	A (% by weight)	B (% by weight)	C (% by weight)	D (% by weight)
Coated sodium percarbonate*	60.00	60.00	61.22	57.25
TAED (bleach activator)	5.00	5.00	5.10	10.00
Layered silicate**	5.00	5.00	5.10	4.00
Sodium carbonate	5.00	5.00	5.10	4.00
Citric acid	20.00	20.00	20.41	20.00
Polyethylene glycol (binder)***	4.50	2.50	2.55	2.50
Paraffin oil	0.50	0.50	0.51	0.25
Disintegrating agent****		2.00		2.00

* Trade name Sodium percarbonate coated-Q10 (boron-containing coating) supplied by Degussa, Frankfurt, Germany

** Trade name SKS-6 supplied by Hoechst AG, Frankfurt, Germany

*** Trade name Pluriol E1500 supplied by BASF, Ludwigshafen, Germany, molecular weight of 1500

**** Trade name Avicel E200 supplied by FMC, Bruxelles, Belgium, cellulose-based disintegrating agent

Example 2

The present accelerated aging tests were performed in order to illustrate the good stability and tablet-technical properties of the tablets.

By the tests performed, the tablets were stored at 40°C and a relative humidity of 75%.

The results appear from the following Table 2.

Table 2

	Time/Recipe	A	B	C	D
Tablet stability (volume increase in %)	2 weeks	0%	1%	0%	5%
	4 weeks	2%	2%	4%	7%
Rate of dissolution at 20°C in water (sec.)*	Start	102	77	143	35
	2 weeks	166	137	214	147
	4 weeks	148	145	180	114
Tablet centre strength (Newton)**	Start	141	152	177	154
	2 weeks	290	258	312	269
	4 weeks	295	238	261	230

* The rate of dissolution is measured visually by placing the tablets in a vessel without stirring.

** The tablet centre strength is expressed as the force necessary for penetrating the tablet by means of a flat piston having a diameter of 8 mm at a rate of 40 mm/min.

As it appears from Table 2, the bleach tablets according to the invention show a good stability. Thus, the volume

is not noticeably increased after storage for 4 weeks under accelerated aging conditions. It should be noted that for tablets of such a size, a volume increase of up to 15% is acceptable under the stated conditions.

Moreover, it appears from Table 2 that the bleach tablets have a satisfactory rate of dissolution which is not increased considerably during storage. In addition, the bleach tablets display a satisfactory tablet strength which is not reduced considerably during storage. It should be noted that compared to the initially values measured within 5 to 24 hours after the preparation, the said storage under extreme conditions causes the rate of dissolution as well as the tablet strength to increase due to the curing of the tablets.

Example 3

Based on the following recipes bleach tablets each weighing 20 g were prepared. The tablets according to recipes F, J and K all had square cross-sections of 33 x 33 mm and heights of approximately 14 to 16 mm. The tablets according to recipes G, H and I all had square cross-sections of 25 mm x 35 mm and heights of approximately 17 to 19 mm.

Table 3

Ingredient/recipe	F% by weight	G % by weight	H % by weight	I % by weight	J % by weight	K % by weight
Coated sodium percarbonate[1)]	60.00	47.00	56.00	47.00	47.00	47.00
TAED HOE 4049[2)]	5.00	13.33	16.00	13.33	13.33	13.33
Norasol WL 2B [3)]	7.50	7.00		6.00	9.27	5.77
Layered silicate[4)]	-	8.92	2.00	7.42	4.90	4.90
Citric acid	20.00	20.00	20.00	20.00	20.00	20.00
Caroate [5)]						2.50
Polyethylene glycol[6)]	4.50	2.50			3.50	3.50
Avicel PH 200[7)]	2.00		2.50	2.50		
Kollidon 30[8)]		1.00			1.50	
Glycerol 99%	0.50					
Paraffin oil	0.50	0.25	0.25	0.25	0.50	0.50
PEG 6000[9)]			3.25	3.50		
Vivapur 200[10)]						2.50
	100.00	100.00	100.00	100.00	100.00	100.00

Table 3 - continued.

1) Confer Table 1.

2) Tetraacetyl ethylenediamine.

3) Co-granulate of 30% polyacrylate with a molecular weight of 4,500 with bicarbonate supplied by NorsoHaas S.A., Verneuil-en-Halatte, France.

4) Confer Table 1.

5) Potassium monopersulphate (bleach) supplied by Degussa AG, Frankfurt am Main, Germany.

6) Confer Table 1.

7) Microcrystalline cellulose supplied by FMC Corp., Philadelphia, USA.

8) Polyvinylpyrrolidone supplied by BASF AG, Ludwigshafen, Germany.

9) Polyethylene glycol with a molecular weight of 6,000.

10) Microcrystalline cellulose supplied by J. Rettenmaier & Söhne GmbH, Weisenborn, Germany.

Example 4

As described above in Example 2, accelerated aging test were performed to illustrate the good stability and tablet-technical properties of the tablets stated in Example 3.

The results appear from the following Table 4.

Example 5

The present tests were carried out so as to compare the bleaching effect of the bleach tablets known from EP

Table 4

	Time/recipe	F	G	H	I	J	K
Tablet stability (volume increase in %)	2 weeks	13%	15%	4%	6%	-	-
Rate of dissolution at 20°C in water (sec.)*	Start	61	42	81	52	68	128
	1 week	120	163	174	131	100	158
	2 weeks	180	146	199	141	120	198
	4 weeks	124	183	165	181	185	212
Tablet centre strength (Newton)**	Start	302	133	180	134	184	178
	1 week	293	213	372	239	239	366
	2 weeks	139	230	360	245	240	400
	4 weeks	88	111	141	247	332	511

* The rate of dissolution was measured placing the tablet in a stainless steel basket having a circular cross-section of a diameter of 50 mm. The steel basket was placed in a 1000 ml beaker, into which 900 ml of 20°C thermostat water (11°dH) was poured. The steel basket was moved vertically upwards and downwards thirty times per minute.

** The tablet centre strength is expressed as the force necessary for penetrating the tablet by means of a flat piston having a diameter of 8 mm at a rate of 40 mm/min.

publication No. 0 481 792 with the bleaching effect of the bleach tablets according to the invention. The test employed the following formulations:

	Lever (according to EP publication No. 0 481 792, Ex. 4)	Recipe E (according to the invention)
Sodium percarbonate	50.00	47.00
TAED 4049	9.00	13.33
Spray-dried sodium carbonate*	41.00	-
SKS-6 layered silicate	-	7.42
Sodium bicarbonate	-	6.00
Citric acid	-	20.00
Pluriol E1500	-	3.50
Avicel disintegrating agent	-	2.50
Paraffin oil	-	0.25

* Spray-dried sodium carbonate:

98% sodium carbonate, 2% polymer (acrylic/maleic copolymer in the form of the sodium salt, Sokalan CP5 supplied by BASF)

The following test conditions were employed:

Machine	Bauknecht WA 1200
Programme:	Standard without prewash
Temperature:	40°C
Water hardness:	25°dH

Amount of fabric:	3.5 kg clean terry towels
Basic detergent composition:	60 g Ariel Future Color, without bleach
Test cloths:	Pre-impregnated pieces of fabric, 10 x 10 cm, from WFK Krefeld, Germany
Number of washings:	4, i.e. the numerical values are an average of 36 measurements, each test cloth being measured on 3 x 3 areas.
Spectrophotometer for measuring the reflectance values:	Minolta CR 200

The results appear from the following Table 5. The reflectance values stated in the table indicate the effeciency of the bleach together with the basic detergent composition used to remove the impregnated stains. A high value means a good efficiency, the theoretically highest possible value being 100 corresponding to a completely white surface.

The cleaning effect is calculated as the percentage increase of the reflectance value compared to an untreated test cloth. The cleaning index is calculated on the basis of the cleaning effect, the highest value of the cleaning effect (Ariel Color + 1 x 30 g recipe E on soil of the type BC1PC-Tea on blend fibres, 25) being set to 100.

Table 5

Comparison tests between the bleach tablets according to EP publication No. 0 481 792, Example 4 (Lever) and the bleach tablets according to the invention (recipe E) so as to test their bleaching effect.

SOIL, TYPE	Untreated test cloths	Ariel Color + 2 x 10 g Lever	Ariel Color + 3 x 10 g Lever	Ariel Color + 1 x 21.3 g Recipe E	Ariel Color + 1 x 30 g Recipe E
REFLECTANCE DATA					
BC2-Coffee on cotton	64.64	69.43	71.94	71.51	73.27
BC1-Tea on cotton	47.45	54.11	55.68	55.41	57.45
BC1PC-Tea on blend fibres	53.65	62.76	64.18	64.18	65.13
BC4-Curry on cotton	68.31	71.07	72.13	72.82	73.19
Average		58.51	64.34	65.98	67.26
CLEANING EFFECT IN %					
BC2-Coffee on cotton		14	21	19	24
BC1-Tea on cotton		13	16	15	19
BC1PC-Tea on blend fibres		20	23	23	25
BC4-Curry on cotton		9	12	14	15
Average		14.0	18.0	17.8	20.8

SOIL, TYPE	CLEANING INDEX				
	Untreated test cloths	Ariel Color + 2 x 10 g Lever	Ariel Color + 3 x 10 g Lever	Ariel Color + 1 x 21.3 g Recipe E	Ariel Color + 1 x 30 g Recipe E
BC2-Coffee on cotton		56	84	76	96
BC1-Tea on cotton		52	64	60	76
BC1PC-Tea on blend fibres		80	92	92	100
BC4-Curry on cotton		36	48	56	60
Average		56.0	72.0	71.0	83.0

As it appears from the results, the bleach tablets according to the invention show an improved bleaching effect over the bleach tablets known from EP publication No. 0 481 792.

Example 6

The present tests were carried out so as to compare the rate of dissolution of the bleach tablets known from EP publication No. 0 481 792 with the rate of dissolution of the bleach tablets according to the invention. The rate of

dissolution were determined as stated in Example 4.

At the tests the recipe according to EP publication No. 481 792, Ex. 4, stated in Example 5 above was used.

The results appear from the following Table 6.

Table 6

Rate of dissolution at 20°C in water (sec.)	Start	2020
	2 weeks	1838
	4 weeks	1725

When comparing the results obtained by the bleach tablets as stated in Tables 2 and 4 with the results stated in Table 6, the bleach tablets according to the invention clearly display a superior rate of dissolution in relation to the bleach tablets known from EP publication No. 0 481 792.

The invention being thus described, it will be obvious that the same may be varied in many ways. Such variations are not to be regarded as a departure from the spirit and scope of the invention, and all such modifications as would be obvious to a person skilled in the art are intended to be included within the scope of the following claims.

Claims

1. Bleach tablets, characterised in that in addition to optional usual adjuvants and additives they comprise

coated percarbonate	45 to 85 % by weight
bleach activator, calculated as TAED	0 to 20 % by weight
layered silicate and/or alkali metal silicate	1 to 50 % by weight
sodium/potassium carbonate	0 to 25 % by weight
sodium/potassium bicarbonate	0 to 25 % by weight
polyfunctional carboxylic acid, calculated as citric acid	5 to 35 % by weight
polyethylene glycol	0 to 8 % by weight
complex-binder	0 to 5 % by weight
paraffin oil	0 to 2 % by weight
disintegrating agent	0 to 5 % by weight
enzymes	0 to 10 % by weight
polymer	0 to 10 % by weight

2. Bleach tablets as as claimed in claim 1, characterised in that the coated percarbonate is an alkali metal percarbonate.

3. Bleach tablets as claimed in claim 1, characterised in that as bleach activator they contain TAED in an amount of from 4 to 15 % by weight.

4. Bleach tablets as claimed in claim 3, characterised in that as bleach activator they contain TAED in an amount of from 4 to 10 % by weight.

5. Bleach tablets as claimed in claim 1, characterised in that the alkali metal silicate is sodium disilicate.

6. Bleach tablets as claimed in claim 1, characterised in that as polyfunctional carboxylic acid they contain citric acid.

7. Bleach tablets as claimed in claim 1, characterised in that the polyethylene glycol has a molecular weight of from 200 to 8,000.

8. Bleach tablets as claimed in claim 1, characterised in that the disintegrating agent is a cellulose-modified or cellulose-based compound.

9. Bleach tablets as claimed in claim 1, characterised in that in addition to optional usual adjuvants and additives they comprise

coated sodium percarbonate	55 to 65 % by weight
TAED	4 to 12 % by weight
layered silicate	3 to 6 % by weight
sodium carbonate	3 to 6 % by weight
citric acid	18 to 22 % by weight
polyethylene glycol	2 to 5 % by weight
paraffin oil	0.1 to 1.0 % by weight
disintegrating agent	0 to 4 % by weight
polymer	0 to 10 % by weight

10. Bleach tablets as claimed in claim 1, characterised in that in addition to optional usual adjuvants and additives they comprise

coated sodium percarbonate	55 to 65 % by weight
TAED	4 to 12 % by weight
layered silicate	3 to 6 % by weight
citric acid	18 to 22 % by weight
polyethylene glycol	2 to 5 % by weight
paraffin oil	0.1 to 1.0 % by weight
disintegrating agent	0 to 4 % by weight
polymer	0 to 10 % by weight